Ka-Band Earth Station – 15 US Locations

Frequency Coordination Report

28 GHz

Prepared on Behalf of
Hughes Network
Systems Limited

July 28, 2017

COMSEARCH®
A CommScope Company

Table of Contents

1. Summary of Results

On behalf of Hughes Network Systems, Comsearch performed a coordination notice for all existing and proposed terrestrial licenses within the respective coordination contours of fifteen proposed Ka-Band earth stations, located throughout the United States, all of which will transmit at 28 GHz[1]. Prior-notification letters were sent to the licensees and a copy of the notification data is provided in section eighteen of this report. The earth station coordination was finalized on July 27, 2017.

No objections were received from any of the incumbent 28 GHz licensees. Our notification to the LMDS incumbents was performed under the assumption that the earth station would be operating on a secondary basis to LMDS Block A operations and a contact at Hughes Network Systems has been provided in case any concerns may arise in the future.

2. Bend, Oregon

28 GHz Common Carrier and LTTS Coordination

In accordance with FCC Rules and Regulations, the Ka-Band earth station in Bend, Oregon was prior-coordinated by Comsearch. A notification letter and datasheet for this earth station were sent to the following 28 GHz common carrier fixed microwave licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Frontier	Continental US

A notification letter and datasheet for the Ka-Band earth station in Bend, Oregon were also sent to the following 28 GHz local television transmission licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

[1] The proposed earth stations will operate in the 27.5 – 28.6 GHz portion of the Ka-Band.

28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensee on June 8, 2017. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
Nextlink Wireless	BTA358	Portland, OR
Verizon[2]	BTA358	Portland, OR
Vivint Wireless[3]	BTA358	Portland, OR
Wilcom, LLC	BTA395	Salem-Albany-Corvallis, OR

No objections were received from the LMDS incumbent.

[2] Verizon is leasing spectrum from Nextlink Wireless in the Portland, Oregon Basic Trading Area (BTA).

[3] Vivint Wireless is leasing spectrum from Nextlink Wireless in the Portland, Oregon BTA.

3. Billings, Montana

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in Billings, Montana were sent to the following 28 GHz common carrier fixed microwave licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Frontier	Continental US

A notification letter and datasheet for the Ka-Band earth station in Billings, Montana were also sent to the following 28 GHz local television transmission licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

The proposed earth station will operate on frequencies that overlap Block A of 28 GHz LMDS services. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

No active LMDS services were found within the coordination contour of the Billings, Montana earth station.

4. Bismarck, North Dakota

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in Bismarck, North Dakota were sent to the following 28 GHz common carrier fixed microwave licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Frontier	Continental US

A notification letter and datasheet for the Ka-Band earth station in Bismarck, North Dakota were also sent to the following 28 GHz local television transmission licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

The proposed earth station will operate on frequencies that overlap Block A of 28 GHz LMDS services. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

No active LMDS services were found within the coordination contour of the Bismarck, North Dakota earth station.

5. Boise, Idaho

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in Boise, Idaho were sent to the following 28 GHz common carrier fixed microwave licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Frontier	Continental US

A notification letter and datasheet for the Ka-Band earth station in Boise, Idaho were also sent to the following 28 GHz local television transmission licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

The proposed earth station will operate on frequencies that overlap Block A of 28 GHz LMDS services. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

No active LMDS services were found within the coordination contour of the Boise, Idaho earth station.

6. Cheyenne, Wyoming

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in Cheyenne, Wyoming were sent to the following 28 GHz common carrier fixed microwave licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Frontier	Continental US

A notification letter and datasheet for the Ka-Band earth station in Cheyenne, Wyoming were also sent to the following 28 GHz local television transmission licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensee on June 8, 2017. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
DISH Network	BTA077[4]	Cheyenne, WY
Nextlink Wireless	BTA110	Denver, CO
Verizon[5]	BTA110	Denver, CO
Vivint Wireless[6]	BTA110	Denver, CO

No objections were received from the LMDS incumbent.

7. Flagstaff, Arizona

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in Flagstaff, Arizona were sent to the following 28 GHz common carrier fixed microwave licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Frontier	Continental US

A notification letter and datasheet for the Ka-Band earth station in Flagstaff, Arizona were also sent to the following 28 GHz local television transmission licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

[4] The proposed earth station will be located inside BTA077.

[5] Verizon is leasing spectrum from Nextlink Wireless in the Denver, Colorado BTA.

[6] Vivint Wireless is leasing spectrum from Nextlink Wireless in the Denver, Colorado BTA.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensee on June 8, 2017. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
DISH Network	BTA347	Phoenix, AZ
Nextlink Wireless[7]	BTA347	Phoenix, AZ

No objections were received from the LMDS incumbent.

8. Lindon, Utah

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in Lindon, Utah were sent to the following 28 GHz common carrier fixed microwave licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Frontier	Continental US

[7] Nextlink Wireless is leasing spectrum from DISH Network in the Phoenix, Arizona BTA.

A notification letter and datasheet for the Ka-Band earth station in Lindon, Utah were also sent to the following 28 GHz local television transmission licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensees on June 8, 2017. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
Straight Path Spectrum	BTA365[8]	Provo-Orem, UT
Straight Path Spectrum	BTA399	Salt Lake City-Ogden, UT
Vivint Wireless[9]	BTA365	Provo-Orem, UT
Vivint Wireless	BTA399	Salt Lake City-Ogden, UT

No objections were received from the LMDS incumbents. Straight Path Spectrum noted the potential for future interference to their system licensed under call sign WPOH634, with planned hubs close to the proposed earth station that have not yet been installed. In the event that Straight Path Spectrum does identify related interference after installation, they will coordinate with Hughes Network Systems and may request that they cease interfering operations.

[8] The proposed earth station will be located inside BTA365.

[9] Vivint Wireless is leasing spectrum from Straight Path Spectrum in the Provo—Orem, Utah and Salt Lake City—Ogden, Utah BTAs.

9. Missoula, Montana

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in Missoula, Montana were sent to the following 28 GHz common carrier fixed microwave licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Frontier	Continental US

A notification letter and datasheet for the Ka-Band earth station in Missoula, Montana were also sent to the following 28 GHz local television transmission licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensee on June 8, 2017. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
Glaicercom	BTA224	Kalispell, MT

No objections were received from the LMDS incumbent.

10. North Las Vegas, Nevada

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in North Las Vegas, Nevada were sent to the following 28 GHz common carrier fixed microwave licensees on June 8, 2017. These licensees are authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide or statewide basis.

Licensee	Authorized Geographic Area
Crosslink Networks	Statewide: California
Frontier	Continental US

A notification letter and datasheet for the Ka-Band earth station in North Las Vegas, Nevada were also sent to the following 28 GHz local television transmission licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensees on June 8, 2017. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
Nextlink Wireless	BTA245[10]	Las Vegas, NV
Nextlink Wireless	BTA262[11]	Los Angeles, CA
T-Mobile	BTA262	Los Angeles, CA
TelePacific Communications[12]	BTA262	Los Angeles, CA
Verizon[13]	BTA245	Las Vegas, NV
Verizon	BTA262	Los Angeles, CA
Vivint Wireless[14]	BTA245	Las Vegas, NV

No objections were received from the LMDS incumbents.

[10] The proposed earth station will be located inside BTA245.

[11] The Los Angeles, California BTA has been partitioned between Nextlink Wireless and T-Mobile.

[12] TelePacific Communications is leasing LMDS spectrum from Nextlink Wireless in the Los Angeles, California BTA.

[13] Verizon is leasing LMDS spectrum from Nextlink Wireless in the Las Vegas, Nevada and Los Angeles, California BTAs.

[14] Vivint Wireless is leasing LMDS spectrum from Nextlink Wireless in the Los Angeles, California BTA.

11. North Platte, Nebraska

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in North Platte, Nebraska were sent to the following 28 GHz common carrier fixed microwave licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Frontier	Continental US

A notification letter and datasheet for the Ka-Band earth station in North Platte, Nebraska were also sent to the following 28 GHz local television transmission licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

The proposed earth station will operate on frequencies that overlap Block A of 28 GHz LMDS services. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

No active LMDS services were found within the coordination contour of the North Platte, Nebraska earth station.

12. Quincy, Washington

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in Quincy, Washington were sent to the following 28 GHz common carrier fixed microwave licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Frontier	Continental US

A notification letter and datasheet for the Ka-Band earth station in Quincy, Washington were also sent to the following 28 GHz local television transmission licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

The proposed earth station will operate on frequencies that overlap Block A of 28 GHz LMDS services. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

No active LMDS services were found within the coordination contour of the Quincy, Washington earth station.

13. Rapid City, South Dakota

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet the Ka-Band earth station in Rapid City, South Dakota were sent to the following 28 GHz common carrier fixed microwave licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Frontier	Continental US

A notification letter and datasheet for the Ka-Band earth station in Rapid City, South Dakota were also sent to the following 28 GHz local television transmission licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

The proposed earth station will operate on frequencies that overlap Block A of 28 GHz LMDS services. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

No active LMDS services were found within the coordination contour of the Rapid City, South Dakota earth station.

14. Rifle, Colorado

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in Rifle, Colorado were sent to the following 28 GHz common carrier fixed microwave licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Frontier	Continental US

A notification letter and datasheet for the Ka-Band earth station in Rifle, Colorado were also sent to the following 28 GHz local television transmission licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensees on June 8, 2017. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
Nextlink Wireless	BTA110	Denver, CO
Verizon[15]	BTA110	Denver, CO
Vivint Wireless[16]	BTA110	Denver, CO

No objections were received from the LMDS incumbents.

[15] Verizon is leasing LMDS spectrum from Nextlink Wireless in the Denver, Colorado BTA.

[16] Vivint Wireless is leasing LMDS spectrum from Nextlink Wireless in the Denver, Colorado BTA.

15. Simi Valley, California

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in Simi Valley, California were sent to the following 28 GHz common carrier fixed microwave licensees on June 8, 2017. These licensees are authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide or statewide basis.

Licensee	Authorized Geographic Area
Crosslink Networks	Statewide: California
Frontier	Continental US

A notification letter and datasheet for the Ka-Band earth station in Simi Valley, California were also sent to the following 28 GHz local television transmission licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensees on June 8, 2017. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
Nextlink Wireless	BTA262[17]	Los Angeles, CA
Nextlink Wireless	BTA405	San Luis Obispo, CA
Nextlink Wireless	BTA406	Santa Barbara-Santa Maria, CA
T-Mobile	BTA262	Los Angeles, CA
TelePacific Communications[18]	BTA262	Los Angeles, CA
Towerstream[19]	BTA262	Los Angeles, CA
Verizon[20]	BTA262	Los Angeles, CA
Verizon	BTA405	San Luis Obispo, CA
Verizon	BTA406	Santa Barbara-Santa Maria, CA
Vivint Wireless[21]	BTA405	San Luis Obispo, CA
Vivint Wireless	BTA406	Santa Barbara-Santa Maria, CA

No objections were received from the LMDS incumbents.

[17] The proposed earth station will be located inside BTA262. This market has been partitioned between Nextlink Wireless and T-Mobile.

[18] TelePacific Communications is leasing LMDS spectrum from Nextlink Wireless in the Los Angeles, California BTA.

[19] Towerstream Corporation is leasing LMDS spectrum from Nextlink Wireless in the Los Angeles, California BTA.

[20] Verizon is leasing LMDS spectrum from Nextlink Wireless in the Los Angeles, California, San Luis Obispo, California, and Santa Barbara—Santa Maria, California BTAs.

[21] Vivint Wireless is leasing LMDS spectrum from Nextlink Wireless in the San Luis Obispo, California and Santa Barbara—Santa Maria, California BTAs.

16. Tucson, Arizona

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in Tucson, Arizona were sent to the following 28 GHz common carrier fixed microwave licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Frontier	Continental US

A notification letter and datasheet for the Ka-Band earth station in Tucson, Arizona were also sent to the following 28 GHz local television transmission licensee on June 8, 2017. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensees on June 8, 2017. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
DISH Network	BTA347	Phoenix, AZ
Nextlink Wireless[22]	BTA347	Phoenix, AZ
Nextlink Wireless	BTA447[23]	Tucson, AZ
Verizon[24]	BTA447	Tucson, AZ
Vivint Wireless[25]	BTA447	Tucson, AZ

No objections were received from the LMDS incumbents.

[22] Nextlink Wireless is leasing LMDS spectrum from DISH Network in the Phoenix, Arizona BTA.

[23] The proposed earth station will be located inside BTA447.

[24] Verizon is leasing LMDS spectrum from Nextlink Wireless in the Tucson, Arizona BTA.

[25] Vivint Wireless is leasing LMDS spectrum from Nextlink Wireless in the Tucson, Arizona BTA.

17. Earth Station Coordination Data

This section presents the data pertinent to the proposed Ka-Band earth stations. This data was circulated to all incumbent licensees in the shared 28 GHz frequency ranges.

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	05/26/2017
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — BEND, OR

Venue Name	
Latitude (NAD 83)	44° 5' 9.8" N
Longitude (NAD 83)	121° 16' 59.3" W
Climate Zone	A
Rain Zone	3
Ground Elevation (AMSL)	1070.39 m / 3511.8 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	95.2° W to 95.2° West Longitude
Azimuth Range	144.9° to 144.9°
Corresponding Elevation Angles	32.9° / 32.9°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		9.2 meter
Gain / Diameter		66.1 dBi / 9.2 m
3-dB / 15-dB Beamwidth		0.08° / 0.16°
Max Available RF Power	(dBW/4 kHz)	-59.0
	(dBW/MHz)	-35.0
Maximum EIRP	(dBW/4 kHz)	7.1
	(dBW/MHz)	31.1
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	450MG7W - 470MG7W / 27500.0 - 28600.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**BEND, OR**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	44° 5' 9.8" N
Longitude (NAD 83)	121° 16' 59.3" W
Ground Elevation (AMSL)	1070.39 m / 3511.8 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	133.38	-10.00	100.00
5	0.00	129.95	-10.00	100.00
10	0.00	126.33	-10.00	100.00
15	0.00	122.57	-10.00	100.00
20	0.00	118.70	-10.00	100.00
25	0.00	114.73	-10.00	100.00
30	0.00	110.68	-10.00	100.00
35	0.00	106.59	-10.00	100.00
40	0.00	102.45	-10.00	100.00
45	0.00	98.28	-10.00	100.00
50	0.00	94.09	-10.00	100.00
55	0.00	89.89	-10.00	100.00
60	0.00	85.70	-10.00	100.00
65	0.00	81.51	-10.00	100.00
70	0.00	77.34	-10.00	100.00
75	0.00	73.20	-10.00	100.00
80	0.00	69.11	-10.00	100.00
85	0.00	65.07	-10.00	100.00
90	0.00	61.10	-10.00	100.00
95	0.00	57.23	-10.00	100.00
100	0.00	53.48	-10.00	100.00
105	0.00	49.87	-10.00	100.00
110	0.00	46.45	-9.67	100.00
115	0.00	43.26	-8.90	100.00
120	0.21	40.21	-8.11	100.00
125	0.29	37.59	-7.38	100.00
130	0.32	35.45	-6.74	100.00
135	0.41	33.78	-6.22	100.00
140	0.47	32.73	-5.87	100.00
145	0.49	32.39	-5.76	100.00
150	0.51	32.73	-5.87	100.00
155	0.50	33.76	-6.21	100.00
160	0.54	35.35	-6.71	100.00
165	0.77	37.32	-7.30	100.00
170	0.91	39.83	-8.00	100.00
175	2.03	42.05	-8.59	100.00
180	3.72	44.42	-9.19	100.00
185	1.87	49.06	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**BEND, OR**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	44° 5' 9.8" N
Longitude (NAD 83)	121° 16' 59.3" W
Ground Elevation (AMSL)	1070.39 m / 3511.8 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	1.45	52.99	-10.00	100.00
195	1.21	56.93	-10.00	100.00
200	0.98	60.96	-10.00	100.00
205	0.99	64.98	-10.00	100.00
210	1.02	69.07	-10.00	100.00
215	1.10	73.20	-10.00	100.00
220	0.83	77.43	-10.00	100.00
225	1.02	81.63	-10.00	100.00
230	1.07	85.86	-10.00	100.00
235	1.16	90.11	-10.00	100.00
240	1.51	94.38	-10.00	100.00
245	2.15	98.69	-10.00	100.00
250	2.63	103.03	-10.00	100.00
255	2.91	107.34	-10.00	100.00
260	2.93	111.59	-10.00	100.00
265	2.68	115.71	-10.00	100.00
270	2.02	119.60	-10.00	100.00
275	1.27	123.29	-10.00	100.00
280	0.83	126.92	-10.00	100.00
285	0.75	130.53	-10.00	100.00
290	0.62	133.93	-10.00	100.00
295	0.67	137.20	-10.00	100.00
300	0.54	140.04	-10.00	100.00
305	0.45	142.54	-10.00	100.00
310	0.00	144.26	-10.00	100.00
315	0.00	145.83	-10.00	100.00
320	0.00	146.80	-10.00	100.00
325	0.00	147.12	-10.00	100.00
330	0.00	146.77	-10.00	100.00
335	0.00	145.76	-10.00	100.00
340	0.00	144.16	-10.00	100.00
345	0.00	142.05	-10.00	100.00
350	0.00	139.49	-10.00	100.00
355	0.00	136.58	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	05/26/2017
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — BILLINGS, MT

Venue Name	
Latitude (NAD 83)	45° 46' 7.7" N
Longitude (NAD 83)	108° 32' 29.5" W
Climate Zone	A
Rain Zone	5
Ground Elevation (AMSL)	962.06 m / 3156.4 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	95.2° W to 95.2° West Longitude
Azimuth Range	161.7° to 161.7°
Corresponding Elevation Angles	35.7° / 35.7°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		9.2 meter
Gain / Diameter		66.1 dBi / 9.2 m
3-dB / 15-dB Beamwidth		0.08° / 0.16°
Max Available RF Power	(dBW/4 kHz)	-59.0
	(dBW/MHz)	-35.0
Maximum EIRP	(dBW/4 kHz)	7.1
	(dBW/MHz)	31.1
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	450MG7W - 470MG7W / 27500.0 - 28600.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**BILLINGS, MT**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	45° 46' 7.7" N
Longitude (NAD 83)	108° 32' 29.5" W
Ground Elevation (AMSL)	962.06 m / 3156.4 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	1.90	142.09	-10.00	100.00
5	1.84	139.70	-10.00	100.00
10	1.74	136.91	-10.00	100.00
15	1.62	133.81	-10.00	100.00
20	1.59	130.52	-10.00	100.00
25	1.47	126.99	-10.00	100.00
30	1.45	123.35	-10.00	100.00
35	1.35	119.56	-10.00	100.00
40	1.15	115.64	-10.00	100.00
45	0.92	111.65	-10.00	100.00
50	0.90	107.67	-10.00	100.00
55	0.00	103.49	-10.00	100.00
60	0.00	99.47	-10.00	100.00
65	0.00	95.43	-10.00	100.00
70	0.47	91.38	-10.00	100.00
75	0.71	87.29	-10.00	100.00
80	1.32	83.15	-10.00	100.00
85	1.44	79.03	-10.00	100.00
90	1.24	74.98	-10.00	100.00
95	1.32	70.94	-10.00	100.00
100	1.31	66.96	-10.00	100.00
105	0.97	63.17	-10.00	100.00
110	0.58	59.53	-10.00	100.00
115	0.61	55.85	-10.00	100.00
120	0.72	52.27	-10.00	100.00
125	0.92	48.80	-10.00	100.00
130	0.83	45.72	-9.50	100.00
135	1.17	42.60	-8.73	100.00
140	1.17	40.04	-8.06	100.00
145	1.71	37.41	-7.33	100.00
150	1.43	35.97	-6.90	100.00
155	1.43	34.82	-6.55	100.00
160	0.76	34.97	-6.59	100.00
165	0.78	35.05	-6.62	100.00
170	0.87	35.67	-6.81	100.00
175	0.89	36.95	-7.19	100.00
180	0.85	38.81	-7.72	100.00
185	0.89	41.05	-8.33	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**BILLINGS, MT**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	45° 46' 7.7" N
Longitude (NAD 83)	108° 32' 29.5" W
Ground Elevation (AMSL)	962.06 m / 3156.4 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	1.05	43.59	-8.98	100.00
195	0.76	46.75	-9.74	100.00
200	0.46	50.14	-10.00	100.00
205	0.61	53.45	-10.00	100.00
210	0.00	57.30	-10.00	100.00
215	0.00	60.97	-10.00	100.00
220	0.00	64.74	-10.00	100.00
225	0.00	68.60	-10.00	100.00
230	0.00	72.53	-10.00	100.00
235	0.00	76.51	-10.00	100.00
240	0.00	80.53	-10.00	100.00
245	0.27	84.55	-10.00	100.00
250	0.31	88.62	-10.00	100.00
255	0.32	92.70	-10.00	100.00
260	0.37	96.77	-10.00	100.00
265	0.40	100.83	-10.00	100.00
270	0.44	104.87	-10.00	100.00
275	0.45	108.86	-10.00	100.00
280	0.46	112.79	-10.00	100.00
285	0.48	116.66	-10.00	100.00
290	0.52	120.45	-10.00	100.00
295	0.54	124.12	-10.00	100.00
300	1.33	128.06	-10.00	100.00
305	1.52	131.57	-10.00	100.00
310	1.64	134.83	-10.00	100.00
315	1.68	137.79	-10.00	100.00
320	1.74	140.43	-10.00	100.00
325	1.90	142.76	-10.00	100.00
330	1.89	144.47	-10.00	100.00
335	1.83	145.57	-10.00	100.00
340	1.94	146.21	-10.00	100.00
345	1.98	146.15	-10.00	100.00
350	1.97	145.39	-10.00	100.00
355	1.95	144.02	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	05/26/2017
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — BISMARCK, ND

Venue Name	
Latitude (NAD 83)	46° 51' 6.0" N
Longitude (NAD 83)	100° 46' 49.1" W
Climate Zone	A
Rain Zone	5
Ground Elevation (AMSL)	581.74 m / 1908.6 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	95.2° W to 95.2° West Longitude
Azimuth Range	172.4° to 172.4°
Corresponding Elevation Angles	35.9° / 35.9°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		9.2 meter
Gain / Diameter		66.1 dBi / 9.2 m
3-dB / 15-dB Beamwidth		0.08° / 0.16°
Max Available RF Power	(dBW/4 kHz)	-59.0
	(dBW/MHz)	-35.0
Maximum EIRP	(dBW/4 kHz)	7.1
	(dBW/MHz)	31.1
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	450MG7W - 470MG7W / 27500.0 - 28600.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**BISMARCK, ND**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	46° 51' 6.0" N
Longitude (NAD 83)	100° 46' 49.1" W
Ground Elevation (AMSL)	581.74 m / 1908.6 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	143.45	-10.00	100.00
5	0.00	142.27	-10.00	100.00
10	0.00	140.58	-10.00	100.00
15	0.00	138.43	-10.00	100.00
20	0.00	135.90	-10.00	100.00
25	0.00	133.05	-10.00	100.00
30	0.00	129.94	-10.00	100.00
35	0.00	126.61	-10.00	100.00
40	0.00	123.11	-10.00	100.00
45	0.00	119.47	-10.00	100.00
50	0.00	115.72	-10.00	100.00
55	0.00	111.88	-10.00	100.00
60	0.00	107.97	-10.00	100.00
65	0.00	104.01	-10.00	100.00
70	0.00	100.00	-10.00	100.00
75	0.00	95.97	-10.00	100.00
80	0.00	91.93	-10.00	100.00
85	0.00	87.87	-10.00	100.00
90	0.00	83.83	-10.00	100.00
95	0.00	79.80	-10.00	100.00
100	0.00	75.79	-10.00	100.00
105	0.00	71.83	-10.00	100.00
110	0.00	67.93	-10.00	100.00
115	0.00	64.09	-10.00	100.00
120	0.00	60.34	-10.00	100.00
125	0.00	56.71	-10.00	100.00
130	0.00	53.22	-10.00	100.00
135	0.00	49.90	-10.00	100.00
140	0.00	46.80	-9.76	100.00
145	0.00	43.97	-9.08	100.00
150	0.00	41.45	-8.44	100.00
155	0.00	39.33	-7.87	100.00
160	0.00	37.66	-7.40	100.00
165	0.00	36.51	-7.06	100.00
170	0.00	35.92	-6.88	100.00
175	0.00	35.94	-6.89	100.00
180	0.00	36.55	-7.07	100.00
185	0.00	37.73	-7.42	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**BISMARCK, ND**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	46° 51' 6.0" N
Longitude (NAD 83)	100° 46' 49.1" W
Ground Elevation (AMSL)	581.74 m / 1908.6 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	39.42	-7.89	100.00
195	0.00	41.57	-8.47	100.00
200	0.00	44.10	-9.11	100.00
205	0.00	46.95	-9.79	100.00
210	0.00	50.06	-10.00	100.00
215	0.00	53.39	-10.00	100.00
220	0.00	56.89	-10.00	100.00
225	0.00	60.53	-10.00	100.00
230	0.00	64.28	-10.00	100.00
235	0.00	68.12	-10.00	100.00
240	0.00	72.03	-10.00	100.00
245	0.00	75.99	-10.00	100.00
250	0.00	80.00	-10.00	100.00
255	0.00	84.03	-10.00	100.00
260	0.25	88.07	-10.00	100.00
265	0.00	92.13	-10.00	100.00
270	0.36	96.20	-10.00	100.00
275	0.46	100.26	-10.00	100.00
280	0.45	104.29	-10.00	100.00
285	0.42	108.27	-10.00	100.00
290	0.35	112.18	-10.00	100.00
295	0.21	115.98	-10.00	100.00
300	0.00	119.66	-10.00	100.00
305	0.00	123.29	-10.00	100.00
310	0.00	126.78	-10.00	100.00
315	0.00	130.10	-10.00	100.00
320	0.00	133.20	-10.00	100.00
325	0.00	136.03	-10.00	100.00
330	0.21	138.72	-10.00	100.00
335	0.00	140.67	-10.00	100.00
340	0.00	142.34	-10.00	100.00
345	0.00	143.49	-10.00	100.00
350	0.00	144.08	-10.00	100.00
355	0.00	144.06	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	05/26/2017
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — BOISE, ID

Venue Name	
Latitude (NAD 83)	43° 36' 29.2" N
Longitude (NAD 83)	116° 18' 36.0" W
Climate Zone	A
Rain Zone	3
Ground Elevation (AMSL)	812.05 m / 2664.2 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	95.2° W to 95.2° West Longitude
Azimuth Range	150.8° to 150.8°
Corresponding Elevation Angles	35.4° / 35.4°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		9.2 meter
Gain / Diameter		66.1 dBi / 9.2 m
3-dB / 15-dB Beamwidth		0.08° / 0.16°
Max Available RF Power	(dBW/4 kHz)	-59.0
	(dBW/MHz)	-35.0
Maximum EIRP	(dBW/4 kHz)	7.1
	(dBW/MHz)	31.1
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	450MG7W - 470MG7W / 27500.0 - 28600.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**BOISE, ID**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	43° 36' 29.2" N
Longitude (NAD 83)	116° 18' 36.0" W
Ground Elevation (AMSL)	812.05 m / 2664.2 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	135.33	-10.00	100.00
5	0.00	132.36	-10.00	100.00
10	0.00	129.14	-10.00	100.00
15	0.00	125.73	-10.00	100.00
20	0.00	122.15	-10.00	100.00
25	0.00	118.45	-10.00	100.00
30	0.00	114.64	-10.00	100.00
35	0.00	110.75	-10.00	100.00
40	0.00	106.79	-10.00	100.00
45	0.00	102.79	-10.00	100.00
50	0.00	98.76	-10.00	100.00
55	0.00	94.70	-10.00	100.00
60	0.00	90.62	-10.00	100.00
65	0.00	86.55	-10.00	100.00
70	0.00	82.48	-10.00	100.00
75	0.00	78.44	-10.00	100.00
80	0.00	74.43	-10.00	100.00
85	0.00	70.46	-10.00	100.00
90	0.00	66.54	-10.00	100.00
95	0.00	62.71	-10.00	100.00
100	0.00	58.97	-10.00	100.00
105	0.39	55.16	-10.00	100.00
110	0.58	51.56	-10.00	100.00
115	0.69	48.17	-10.00	100.00
120	0.83	44.97	-9.32	100.00
125	0.90	42.09	-8.60	100.00
130	0.77	39.71	-7.97	100.00
135	0.97	37.47	-7.34	100.00
140	1.01	35.85	-6.86	100.00
145	1.02	34.81	-6.54	100.00
150	0.98	34.44	-6.43	100.00
155	0.95	34.69	-6.50	100.00
160	1.08	35.40	-6.73	100.00
165	1.25	36.67	-7.11	100.00
170	1.28	38.60	-7.66	100.00
175	1.25	41.02	-8.32	100.00
180	1.02	43.94	-9.07	100.00
185	0.98	47.01	-9.80	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**BOISE, ID**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	43° 36' 29.2" N
Longitude (NAD 83)	116° 18' 36.0" W
Ground Elevation (AMSL)	812.05 m / 2664.2 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.96	50.30	-10.00	100.00
195	0.95	53.79	-10.00	100.00
200	0.92	57.44	-10.00	100.00
205	0.82	61.24	-10.00	100.00
210	0.77	65.11	-10.00	100.00
215	0.77	69.05	-10.00	100.00
220	0.66	73.07	-10.00	100.00
225	0.56	77.12	-10.00	100.00
230	0.43	81.20	-10.00	100.00
235	0.32	85.29	-10.00	100.00
240	0.00	89.38	-10.00	100.00
245	0.00	93.45	-10.00	100.00
250	0.00	97.52	-10.00	100.00
255	0.00	101.56	-10.00	100.00
260	0.00	105.57	-10.00	100.00
265	0.00	109.54	-10.00	100.00
270	0.00	113.46	-10.00	100.00
275	0.00	117.29	-10.00	100.00
280	0.00	121.03	-10.00	100.00
285	0.00	124.65	-10.00	100.00
290	0.00	128.12	-10.00	100.00
295	0.00	131.40	-10.00	100.00
300	0.00	134.45	-10.00	100.00
305	0.00	137.22	-10.00	100.00
310	0.00	139.65	-10.00	100.00
315	0.00	141.66	-10.00	100.00
320	0.00	143.19	-10.00	100.00
325	0.00	144.18	-10.00	100.00
330	0.00	144.58	-10.00	100.00
335	0.00	144.37	-10.00	100.00
340	0.00	143.56	-10.00	100.00
345	0.00	142.18	-10.00	100.00
350	0.00	140.31	-10.00	100.00
355	0.00	138.00	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	05/26/2017
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — CHEYENNE, WY

Venue Name	
Latitude (NAD 83)	41° 7' 55.9" N
Longitude (NAD 83)	104° 44' 8.0" W
Climate Zone	A
Rain Zone	2
Ground Elevation (AMSL)	1811.56 m / 5943.5 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	95.2° W to 95.2° West Longitude
Azimuth Range	165.7° to 165.7°
Corresponding Elevation Angles	41.5° / 41.5°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		9.2 meter
Gain / Diameter		66.1 dBi / 9.2 m
3-dB / 15-dB Beamwidth		0.08° / 0.16°
Max Available RF Power	(dBW/4 kHz)	-59.0
	(dBW/MHz)	-35.0
Maximum EIRP	(dBW/4 kHz)	7.1
	(dBW/MHz)	31.1
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	450MG7W - 470MG7W / 27500.0 - 28600.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**CHEYENNE, WY**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	41° 7' 55.9" N
Longitude (NAD 83)	104° 44' 8.0" W
Ground Elevation (AMSL)	1811.56 m / 5943.5 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.80	137.31	-10.00	100.00
5	0.81	135.72	-10.00	100.00
10	0.86	133.78	-10.00	100.00
15	0.81	131.41	-10.00	100.00
20	0.81	128.80	-10.00	100.00
25	0.81	125.94	-10.00	100.00
30	0.84	122.89	-10.00	100.00
35	0.74	119.60	-10.00	100.00
40	0.69	116.21	-10.00	100.00
45	0.66	112.72	-10.00	100.00
50	0.62	109.14	-10.00	100.00
55	0.48	105.46	-10.00	100.00
60	0.43	101.76	-10.00	100.00
65	0.39	98.03	-10.00	100.00
70	0.34	94.27	-10.00	100.00
75	0.32	90.51	-10.00	100.00
80	0.36	86.74	-10.00	100.00
85	0.37	82.99	-10.00	100.00
90	0.40	79.25	-10.00	100.00
95	0.00	75.64	-10.00	100.00
100	0.00	72.02	-10.00	100.00
105	0.00	68.47	-10.00	100.00
110	0.00	65.00	-10.00	100.00
115	0.24	61.53	-10.00	100.00
120	0.53	58.14	-10.00	100.00
125	0.55	55.03	-10.00	100.00
130	0.59	52.11	-10.00	100.00
135	0.64	49.39	-10.00	100.00
140	0.76	46.90	-9.78	100.00
145	0.64	44.93	-9.31	100.00
150	0.71	43.17	-8.88	100.00
155	0.80	41.80	-8.53	100.00
160	0.82	40.97	-8.31	100.00
165	0.74	40.73	-8.25	100.00
170	0.80	40.85	-8.28	100.00
175	0.83	41.51	-8.45	100.00
180	0.79	42.70	-8.76	100.00
185	0.80	44.29	-9.16	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**CHEYENNE, WY**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	41° 7' 55.9" N
Longitude (NAD 83)	104° 44' 8.0" W
Ground Elevation (AMSL)	1811.56 m / 5943.5 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.88	46.21	-9.62	100.00
195	0.85	48.56	-10.00	100.00
200	0.86	51.17	-10.00	100.00
205	0.84	54.05	-10.00	100.00
210	0.91	57.07	-10.00	100.00
215	0.95	60.29	-10.00	100.00
220	0.93	63.69	-10.00	100.00
225	0.85	67.21	-10.00	100.00
230	0.79	70.81	-10.00	100.00
235	0.59	74.51	-10.00	100.00
240	0.76	78.18	-10.00	100.00
245	0.58	81.95	-10.00	100.00
250	0.45	85.72	-10.00	100.00
255	0.66	89.49	-10.00	100.00
260	0.84	93.28	-10.00	100.00
265	1.02	97.08	-10.00	100.00
270	0.96	100.84	-10.00	100.00
275	1.24	104.63	-10.00	100.00
280	1.27	108.34	-10.00	100.00
285	1.11	111.91	-10.00	100.00
290	0.90	115.36	-10.00	100.00
295	0.83	118.74	-10.00	100.00
300	0.78	121.99	-10.00	100.00
305	0.78	125.11	-10.00	100.00
310	0.59	127.90	-10.00	100.00
315	0.71	130.66	-10.00	100.00
320	0.56	132.93	-10.00	100.00
325	0.60	135.03	-10.00	100.00
330	0.67	136.80	-10.00	100.00
335	0.84	138.23	-10.00	100.00
340	0.85	139.06	-10.00	100.00
345	0.80	139.34	-10.00	100.00
350	0.86	139.21	-10.00	100.00
355	0.85	138.51	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	05/25/2017
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — FLAGSTAFF, AZ

Venue Name	
Latitude (NAD 83)	35° 11' 26.6" N
Longitude (NAD 83)	111° 37' 55.4" W
Climate Zone	A
Rain Zone	5
Ground Elevation (AMSL)	2094.05 m / 6870.2 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	95.2° W to 95.2° West Longitude
Azimuth Range	152.9° to 152.9°
Corresponding Elevation Angles	45.5° / 45.5°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		9.2 meter
Gain / Diameter		66.1 dBi / 9.2 m
3-dB / 15-dB Beamwidth		0.08° / 0.16°
Max Available RF Power	(dBW/4 kHz)	-59.0
	(dBW/MHz)	-35.0
Maximum EIRP	(dBW/4 kHz)	7.1
	(dBW/MHz)	31.1
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	450MG7W - 470MG7W / 27500.0 - 28600.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**FLAGSTAFF, AZ**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	35° 11' 26.6" N
Longitude (NAD 83)	111° 37' 55.4" W
Ground Elevation (AMSL)	2094.05 m / 6870.2 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	3.16	131.12	-10.00	100.00
5	2.56	128.30	-10.00	100.00
10	4.05	126.69	-10.00	100.00
15	5.82	124.80	-10.00	100.00
20	6.29	121.81	-10.00	100.00
25	5.92	118.25	-10.00	100.00
30	6.42	114.93	-10.00	100.00
35	4.88	110.79	-10.00	100.00
40	2.01	106.39	-10.00	100.00
45	1.41	102.75	-10.00	100.00
50	0.80	99.13	-10.00	100.00
55	0.00	95.53	-10.00	100.00
60	0.00	92.03	-10.00	100.00
65	0.00	88.53	-10.00	100.00
70	0.00	85.03	-10.00	100.00
75	0.00	81.56	-10.00	100.00
80	0.00	78.11	-10.00	100.00
85	0.00	74.72	-10.00	100.00
90	0.00	71.39	-10.00	100.00
95	0.00	68.15	-10.00	100.00
100	0.22	64.90	-10.00	100.00
105	0.32	61.82	-10.00	100.00
110	0.37	58.90	-10.00	100.00
115	0.35	56.21	-10.00	100.00
120	0.45	53.64	-10.00	100.00
125	0.48	51.37	-10.00	100.00
130	0.54	49.35	-10.00	100.00
135	0.60	47.65	-9.95	100.00
140	0.51	46.46	-9.68	100.00
145	0.55	45.53	-9.46	100.00
150	0.54	45.07	-9.35	100.00
155	0.29	45.28	-9.40	100.00
160	0.36	45.61	-9.48	100.00
165	0.57	46.22	-9.62	100.00
170	0.51	47.50	-9.92	100.00
175	0.69	48.93	-10.00	100.00
180	0.70	50.86	-10.00	100.00
185	0.58	53.16	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**FLAGSTAFF, AZ**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	35° 11' 26.6" N
Longitude (NAD 83)	111° 37' 55.4" W
Ground Elevation (AMSL)	2094.05 m / 6870.2 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.63	55.60	-10.00	100.00
195	0.51	58.37	-10.00	100.00
200	0.56	61.21	-10.00	100.00
205	0.53	64.26	-10.00	100.00
210	0.52	67.42	-10.00	100.00
215	0.47	70.70	-10.00	100.00
220	0.54	74.03	-10.00	100.00
225	0.44	77.47	-10.00	100.00
230	0.34	80.95	-10.00	100.00
235	0.48	84.43	-10.00	100.00
240	0.54	87.95	-10.00	100.00
245	0.59	91.49	-10.00	100.00
250	1.08	95.06	-10.00	100.00
255	1.02	98.60	-10.00	100.00
260	0.73	102.04	-10.00	100.00
265	0.65	105.46	-10.00	100.00
270	0.64	108.82	-10.00	100.00
275	1.18	112.33	-10.00	100.00
280	1.69	115.79	-10.00	100.00
285	1.90	119.03	-10.00	100.00
290	1.78	121.94	-10.00	100.00
295	1.94	124.85	-10.00	100.00
300	1.76	127.32	-10.00	100.00
305	1.72	129.62	-10.00	100.00
310	2.02	131.91	-10.00	100.00
315	2.34	133.92	-10.00	100.00
320	2.88	135.80	-10.00	100.00
325	1.89	135.78	-10.00	100.00
330	1.37	135.76	-10.00	100.00
335	1.07	135.49	-10.00	100.00
340	1.89	135.90	-10.00	100.00
345	2.77	135.88	-10.00	100.00
350	3.77	135.47	-10.00	100.00
355	3.38	133.38	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	05/26/2017
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — LINDON, UT

Venue Name	
Latitude (NAD 83)	40° 19' 58.1" N
Longitude (NAD 83)	111° 43' 50.2" W
Climate Zone	A
Rain Zone	5
Ground Elevation (AMSL)	1398.37 m / 4587.8 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	95.2° W to 95.2° West Longitude
Azimuth Range	155.4° to 155.4°
Corresponding Elevation Angles	40.3° / 40.3°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		9.2 meter
Gain / Diameter		66.1 dBi / 9.2 m
3-dB / 15-dB Beamwidth		0.08° / 0.16°
Max Available RF Power	(dBW/4 kHz)	-59.0
	(dBW/MHz)	-35.0
Maximum EIRP	(dBW/4 kHz)	7.1
	(dBW/MHz)	31.1
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	450MG7W - 470MG7W / 27500.0 - 28600.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**LINDON, UT**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	40° 19' 58.1" N
Longitude (NAD 83)	111° 43' 50.2" W
Ground Elevation (AMSL)	1398.37 m / 4587.8 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	3.77	136.90	-10.00	100.00
5	5.46	135.49	-10.00	100.00
10	8.11	134.11	-10.00	100.00
15	8.59	130.92	-10.00	100.00
20	7.74	126.84	-10.00	100.00
25	6.33	122.48	-10.00	100.00
30	7.52	119.11	-10.00	100.00
35	7.67	115.19	-10.00	100.00
40	7.75	111.16	-10.00	100.00
45	8.47	107.19	-10.00	100.00
50	8.56	103.02	-10.00	100.00
55	10.27	98.96	-10.00	100.00
60	10.09	94.64	-10.00	100.00
65	7.58	90.31	-10.00	100.00
70	7.25	86.12	-10.00	100.00
75	5.98	82.06	-10.00	100.00
80	5.79	77.99	-10.00	100.00
85	4.86	74.12	-10.00	100.00
90	3.96	70.39	-10.00	100.00
95	3.21	66.78	-10.00	100.00
100	2.41	63.37	-10.00	100.00
105	2.34	59.82	-10.00	100.00
110	2.21	56.45	-10.00	100.00
115	2.11	53.23	-10.00	100.00
120	2.09	50.18	-10.00	100.00
125	2.09	47.34	-9.88	100.00
130	2.05	44.83	-9.29	100.00
135	1.96	42.69	-8.76	100.00
140	1.72	41.11	-8.35	100.00
145	1.52	39.96	-8.04	100.00
150	1.19	39.45	-7.90	100.00
155	1.07	39.27	-7.85	100.00
160	0.93	39.63	-7.95	100.00
165	0.61	40.68	-8.24	100.00
170	0.33	42.17	-8.62	100.00
175	0.00	44.11	-9.11	100.00
180	0.00	46.14	-9.60	100.00
185	0.00	48.50	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**LINDON, UT**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	40° 19' 58.1" N
Longitude (NAD 83)	111° 43' 50.2" W
Ground Elevation (AMSL)	1398.37 m / 4587.8 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	51.15	-10.00	100.00
195	0.00	54.05	-10.00	100.00
200	0.00	57.15	-10.00	100.00
205	0.00	60.41	-10.00	100.00
210	0.00	63.82	-10.00	100.00
215	0.00	67.33	-10.00	100.00
220	0.00	70.94	-10.00	100.00
225	0.00	74.61	-10.00	100.00
230	0.00	78.34	-10.00	100.00
235	0.00	82.11	-10.00	100.00
240	0.00	85.91	-10.00	100.00
245	0.00	89.72	-10.00	100.00
250	0.00	93.53	-10.00	100.00
255	0.00	97.33	-10.00	100.00
260	0.00	101.10	-10.00	100.00
265	0.00	104.84	-10.00	100.00
270	0.00	108.52	-10.00	100.00
275	0.00	112.14	-10.00	100.00
280	0.00	115.67	-10.00	100.00
285	0.00	119.09	-10.00	100.00
290	0.00	122.38	-10.00	100.00
295	0.00	125.51	-10.00	100.00
300	0.00	128.43	-10.00	100.00
305	0.00	131.12	-10.00	100.00
310	0.00	133.53	-10.00	100.00
315	0.00	135.61	-10.00	100.00
320	0.00	137.31	-10.00	100.00
325	0.00	138.58	-10.00	100.00
330	0.32	139.69	-10.00	100.00
335	0.36	140.02	-10.00	100.00
340	0.38	139.83	-10.00	100.00
345	0.42	139.13	-10.00	100.00
350	0.66	138.13	-10.00	100.00
355	1.84	137.49	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	05/26/2017
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — MISSOULA, MT

Venue Name	
Latitude (NAD 83)	46° 56' 11.5" N
Longitude (NAD 83)	114° 6' 54.1" W
Climate Zone	A
Rain Zone	5
Ground Elevation (AMSL)	975.38 m / 3200.1 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	95.2° W to 95.2° West Longitude
Azimuth Range	154.9° to 154.9°
Corresponding Elevation Angles	32.9° / 32.9°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		9.2 meter
Gain / Diameter		66.1 dBi / 9.2 m
3-dB / 15-dB Beamwidth		0.08° / 0.16°
Max Available RF Power	(dBW/4 kHz)	-59.0
	(dBW/MHz)	-35.0
Maximum EIRP	(dBW/4 kHz)	7.1
	(dBW/MHz)	31.1
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	450MG7W - 470MG7W / 27500.0 - 28600.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**MISSOULA, MT**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	46° 56' 11.5" N
Longitude (NAD 83)	114° 6' 54.1" W
Ground Elevation (AMSL)	975.38 m / 3200.1 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	2.43	141.26	-10.00	100.00
5	2.55	138.25	-10.00	100.00
10	2.93	135.09	-10.00	100.00
15	3.04	131.51	-10.00	100.00
20	3.34	127.84	-10.00	100.00
25	3.49	123.93	-10.00	100.00
30	3.48	119.86	-10.00	100.00
35	3.28	115.65	-10.00	100.00
40	3.12	111.40	-10.00	100.00
45	3.23	107.17	-10.00	100.00
50	3.02	102.85	-10.00	100.00
55	2.87	98.53	-10.00	100.00
60	2.60	94.21	-10.00	100.00
65	3.34	89.89	-10.00	100.00
70	3.38	85.54	-10.00	100.00
75	3.83	81.17	-10.00	100.00
80	3.91	76.81	-10.00	100.00
85	3.36	72.59	-10.00	100.00
90	3.12	68.39	-10.00	100.00
95	2.43	64.38	-10.00	100.00
100	2.33	60.32	-10.00	100.00
105	2.16	56.38	-10.00	100.00
110	0.85	53.11	-10.00	100.00
115	0.50	49.64	-10.00	100.00
120	0.00	46.49	-9.68	100.00
125	0.00	43.31	-8.91	100.00
130	0.00	40.42	-8.16	100.00
135	0.00	37.89	-7.46	100.00
140	0.00	35.80	-6.85	100.00
145	0.00	34.23	-6.36	100.00
150	0.00	33.26	-6.05	100.00
155	0.00	32.95	-5.94	100.00
160	0.00	33.30	-6.06	100.00
165	0.00	34.30	-6.38	100.00
170	0.00	35.89	-6.88	100.00
175	0.00	38.01	-7.50	100.00
180	0.00	40.55	-8.20	100.00
185	0.00	43.46	-8.95	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**MISSOULA, MT**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	46° 56' 11.5" N
Longitude (NAD 83)	114° 6' 54.1" W
Ground Elevation (AMSL)	975.38 m / 3200.1 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	1.10	45.99	-9.57	100.00
195	1.19	49.45	-10.00	100.00
200	1.49	53.00	-10.00	100.00
205	1.82	56.71	-10.00	100.00
210	2.42	60.49	-10.00	100.00
215	2.18	64.66	-10.00	100.00
220	1.78	68.91	-10.00	100.00
225	2.70	72.92	-10.00	100.00
230	1.25	77.38	-10.00	100.00
235	2.62	81.49	-10.00	100.00
240	1.09	85.86	-10.00	100.00
245	1.49	90.11	-10.00	100.00
250	1.84	94.39	-10.00	100.00
255	1.15	98.59	-10.00	100.00
260	1.29	102.83	-10.00	100.00
265	0.00	106.78	-10.00	100.00
270	0.82	111.07	-10.00	100.00
275	0.63	115.10	-10.00	100.00
280	0.00	118.87	-10.00	100.00
285	0.00	122.74	-10.00	100.00
290	0.00	126.49	-10.00	100.00
295	0.00	130.09	-10.00	100.00
300	0.36	133.73	-10.00	100.00
305	0.47	137.01	-10.00	100.00
310	0.50	139.96	-10.00	100.00
315	0.59	142.60	-10.00	100.00
320	0.90	145.01	-10.00	100.00
325	0.92	146.64	-10.00	100.00
330	0.99	147.71	-10.00	100.00
335	1.59	148.65	-10.00	100.00
340	1.99	148.66	-10.00	100.00
345	2.19	147.77	-10.00	100.00
350	1.70	145.62	-10.00	100.00
355	1.94	143.59	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	05/26/2017
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — N LAS VEGAS, NV

Venue Name	
Latitude (NAD 83)	36° 14' 14.2" N
Longitude (NAD 83)	115° 7' 0.7" W
Climate Zone	A
Rain Zone	5
Ground Elevation (AMSL)	586.23 m / 1923.3 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	95.2° W to 95.2° West Longitude
Azimuth Range	148.5° to 148.5°
Corresponding Elevation Angles	43.0° / 43.0°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		9.2 meter
Gain / Diameter		66.1 dBi / 9.2 m
3-dB / 15-dB Beamwidth		0.08° / 0.16°
Max Available RF Power	(dBW/4 kHz)	-59.0
	(dBW/MHz)	-35.0
Maximum EIRP	(dBW/4 kHz)	7.1
	(dBW/MHz)	31.1
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	450MG7W - 470MG7W / 27500.0 - 28600.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**N LAS VEGAS, NV**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	36° 14' 14.2" N
Longitude (NAD 83)	115° 7' 0.7" W
Ground Elevation (AMSL)	586.23 m / 1923.3 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.65	129.09	-10.00	100.00
5	0.68	126.49	-10.00	100.00
10	0.72	123.67	-10.00	100.00
15	0.72	120.64	-10.00	100.00
20	0.70	117.43	-10.00	100.00
25	0.65	114.09	-10.00	100.00
30	0.59	110.64	-10.00	100.00
35	0.50	107.10	-10.00	100.00
40	0.40	103.51	-10.00	100.00
45	0.32	99.88	-10.00	100.00
50	0.24	96.23	-10.00	100.00
55	0.00	92.56	-10.00	100.00
60	0.00	88.90	-10.00	100.00
65	0.00	85.25	-10.00	100.00
70	0.00	81.61	-10.00	100.00
75	0.00	78.00	-10.00	100.00
80	0.00	74.44	-10.00	100.00
85	0.00	70.94	-10.00	100.00
90	0.00	67.52	-10.00	100.00
95	0.00	64.19	-10.00	100.00
100	0.00	60.99	-10.00	100.00
105	0.00	57.94	-10.00	100.00
110	0.00	55.06	-10.00	100.00
115	0.00	52.39	-10.00	100.00
120	0.00	49.98	-10.00	100.00
125	0.00	47.85	-10.00	100.00
130	0.00	46.05	-9.58	100.00
135	0.00	44.64	-9.24	100.00
140	0.00	43.64	-9.00	100.00
145	0.00	43.08	-8.86	100.00
150	0.00	42.99	-8.83	100.00
155	0.00	43.36	-8.93	100.00
160	0.00	44.19	-9.13	100.00
165	0.00	45.44	-9.44	100.00
170	0.00	47.09	-9.82	100.00
175	0.00	49.09	-10.00	100.00
180	0.00	51.40	-10.00	100.00
185	0.00	53.97	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**N LAS VEGAS, NV**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	36° 14' 14.2" N
Longitude (NAD 83)	115° 7' 0.7" W
Ground Elevation (AMSL)	586.23 m / 1923.3 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	56.77	-10.00	100.00
195	0.00	59.76	-10.00	100.00
200	0.00	62.90	-10.00	100.00
205	0.21	66.09	-10.00	100.00
210	0.25	69.48	-10.00	100.00
215	0.38	72.93	-10.00	100.00
220	0.52	76.46	-10.00	100.00
225	0.47	80.09	-10.00	100.00
230	0.51	83.74	-10.00	100.00
235	0.75	87.41	-10.00	100.00
240	0.78	91.11	-10.00	100.00
245	0.82	94.82	-10.00	100.00
250	0.81	98.50	-10.00	100.00
255	0.80	102.15	-10.00	100.00
260	0.79	105.76	-10.00	100.00
265	0.74	109.30	-10.00	100.00
270	0.71	112.75	-10.00	100.00
275	0.65	116.10	-10.00	100.00
280	0.64	119.34	-10.00	100.00
285	0.65	122.44	-10.00	100.00
290	0.69	125.39	-10.00	100.00
295	0.68	128.09	-10.00	100.00
300	0.69	130.56	-10.00	100.00
305	0.69	132.73	-10.00	100.00
310	0.71	134.58	-10.00	100.00
315	0.70	136.02	-10.00	100.00
320	0.68	137.03	-10.00	100.00
325	0.67	137.59	-10.00	100.00
330	0.64	137.66	-10.00	100.00
335	0.60	137.23	-10.00	100.00
340	0.52	136.31	-10.00	100.00
345	0.52	135.03	-10.00	100.00
350	0.59	133.42	-10.00	100.00
355	0.63	131.42	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	05/26/2017
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — N PLATTE, NE

Venue Name	
Latitude (NAD 83)	41° 5' 24.2" N
Longitude (NAD 83)	100° 45' 10.6" W
Climate Zone	A
Rain Zone	2
Ground Elevation (AMSL)	858.5 m / 2816.6 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	95.2° W to 95.2° West Longitude
Azimuth Range	171.6° to 171.6°
Corresponding Elevation Angles	42.2° / 42.2°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		9.2 meter
Gain / Diameter		66.1 dBi / 9.2 m
3-dB / 15-dB Beamwidth		0.08° / 0.16°
Max Available RF Power	(dBW/4 kHz)	-59.0
	(dBW/MHz)	-35.0
Maximum EIRP	(dBW/4 kHz)	7.1
	(dBW/MHz)	31.1
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	450MG7W - 470MG7W / 27500.0 - 28600.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**N PLATTE, NE**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	41° 5' 24.2" N
Longitude (NAD 83)	100° 45' 10.6" W
Ground Elevation (AMSL)	858.5 m / 2816.6 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	137.16	-10.00	100.00
5	0.00	136.13	-10.00	100.00
10	0.00	134.69	-10.00	100.00
15	0.00	132.86	-10.00	100.00
20	0.00	130.69	-10.00	100.00
25	0.00	128.22	-10.00	100.00
30	0.00	125.50	-10.00	100.00
35	0.00	122.58	-10.00	100.00
40	0.00	119.47	-10.00	100.00
45	0.00	116.22	-10.00	100.00
50	0.00	112.85	-10.00	100.00
55	0.00	109.37	-10.00	100.00
60	0.00	105.83	-10.00	100.00
65	0.00	102.22	-10.00	100.00
70	0.00	98.56	-10.00	100.00
75	0.00	94.88	-10.00	100.00
80	0.00	91.18	-10.00	100.00
85	0.00	87.47	-10.00	100.00
90	0.00	83.78	-10.00	100.00
95	0.00	80.10	-10.00	100.00
100	0.00	76.46	-10.00	100.00
105	0.00	72.87	-10.00	100.00
110	0.30	69.25	-10.00	100.00
115	0.40	65.75	-10.00	100.00
120	0.60	62.30	-10.00	100.00
125	0.90	58.90	-10.00	100.00
130	0.89	55.80	-10.00	100.00
135	0.72	53.00	-10.00	100.00
140	0.94	50.16	-10.00	100.00
145	1.38	47.38	-9.89	100.00
150	1.65	45.02	-9.33	100.00
155	1.63	43.25	-8.90	100.00
160	1.45	42.06	-8.60	100.00
165	1.78	40.83	-8.27	100.00
170	2.01	40.18	-8.10	100.00
175	1.53	40.75	-8.25	100.00
180	1.58	41.30	-8.40	100.00
185	1.47	42.48	-8.70	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**N PLATTE, NE**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	41° 5' 24.2" N
Longitude (NAD 83)	100° 45' 10.6" W
Ground Elevation (AMSL)	858.5 m / 2816.6 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	1.67	43.82	-9.04	100.00
195	1.74	45.69	-9.50	100.00
200	1.88	47.86	-10.00	100.00
205	2.13	50.28	-10.00	100.00
210	2.08	53.17	-10.00	100.00
215	1.66	56.47	-10.00	100.00
220	1.34	59.85	-10.00	100.00
225	1.83	62.98	-10.00	100.00
230	1.54	66.57	-10.00	100.00
235	1.16	70.26	-10.00	100.00
240	0.76	73.98	-10.00	100.00
245	0.56	77.67	-10.00	100.00
250	0.61	81.35	-10.00	100.00
255	0.40	85.09	-10.00	100.00
260	0.32	88.82	-10.00	100.00
265	0.25	92.54	-10.00	100.00
270	0.00	96.22	-10.00	100.00
275	0.00	99.90	-10.00	100.00
280	0.00	103.54	-10.00	100.00
285	0.00	107.13	-10.00	100.00
290	0.00	110.65	-10.00	100.00
295	0.00	114.09	-10.00	100.00
300	0.00	117.42	-10.00	100.00
305	0.00	120.62	-10.00	100.00
310	0.00	123.67	-10.00	100.00
315	0.00	126.52	-10.00	100.00
320	0.00	129.15	-10.00	100.00
325	0.00	131.51	-10.00	100.00
330	0.00	133.57	-10.00	100.00
335	0.00	135.26	-10.00	100.00
340	0.00	136.56	-10.00	100.00
345	0.00	137.42	-10.00	100.00
350	0.00	137.81	-10.00	100.00
355	0.00	137.72	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	05/26/2017
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — QUINCY, WA

Venue Name	
Latitude (NAD 83)	47° 14' 52.6" N
Longitude (NAD 83)	119° 48' 54.2" W
Climate Zone	A
Rain Zone	5
Ground Elevation (AMSL)	399.36 m / 1310.2 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	95.2° W to 95.2° West Longitude
Azimuth Range	148.0° to 148.0°
Corresponding Elevation Angles	30.6° / 30.6°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		9.2 meter
Gain / Diameter		66.1 dBi / 9.2 m
3-dB / 15-dB Beamwidth		0.08° / 0.16°
Max Available RF Power	(dBW/4 kHz)	-59.0
	(dBW/MHz)	-35.0
Maximum EIRP	(dBW/4 kHz)	7.1
	(dBW/MHz)	31.1
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	450MG7W - 470MG7W / 27500.0 - 28600.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**QUINCY, WA**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	47° 14' 52.6" N
Longitude (NAD 83)	119° 48' 54.2" W
Ground Elevation (AMSL)	399.36 m / 1310.2 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	2.93	138.70	-10.00	100.00
5	3.15	135.15	-10.00	100.00
10	3.19	131.30	-10.00	100.00
15	2.95	127.19	-10.00	100.00
20	2.59	122.95	-10.00	100.00
25	2.34	118.69	-10.00	100.00
30	2.15	114.41	-10.00	100.00
35	1.98	110.09	-10.00	100.00
40	1.71	105.73	-10.00	100.00
45	1.50	101.37	-10.00	100.00
50	1.21	97.00	-10.00	100.00
55	0.99	92.64	-10.00	100.00
60	0.76	88.30	-10.00	100.00
65	0.57	83.98	-10.00	100.00
70	0.37	79.69	-10.00	100.00
75	0.23	75.43	-10.00	100.00
80	0.00	71.23	-10.00	100.00
85	0.00	67.04	-10.00	100.00
90	0.00	62.91	-10.00	100.00
95	0.00	58.85	-10.00	100.00
100	0.00	54.88	-10.00	100.00
105	0.00	51.03	-10.00	100.00
110	0.00	47.34	-9.88	100.00
115	0.00	43.84	-9.05	100.00
120	0.00	40.58	-8.21	100.00
125	0.00	37.64	-7.39	100.00
130	0.00	35.10	-6.63	100.00
135	0.00	33.04	-5.98	100.00
140	0.00	31.57	-5.48	100.00
145	0.00	30.77	-5.20	100.00
150	0.00	30.69	-5.17	100.00
155	0.00	31.34	-5.40	100.00
160	0.00	32.67	-5.85	100.00
165	0.00	34.61	-6.48	100.00
170	0.00	37.06	-7.22	100.00
175	0.00	39.92	-8.03	100.00
180	0.00	43.11	-8.86	100.00
185	0.00	46.56	-9.70	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**QUINCY, WA**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	47° 14' 52.6" N
Longitude (NAD 83)	119° 48' 54.2" W
Ground Elevation (AMSL)	399.36 m / 1310.2 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	50.22	-10.00	100.00
195	0.00	54.04	-10.00	100.00
200	0.00	57.98	-10.00	100.00
205	0.00	62.02	-10.00	100.00
210	0.00	66.14	-10.00	100.00
215	0.00	70.32	-10.00	100.00
220	0.00	74.54	-10.00	100.00
225	0.00	78.80	-10.00	100.00
230	0.00	83.09	-10.00	100.00
235	0.00	87.38	-10.00	100.00
240	0.00	91.69	-10.00	100.00
245	0.00	95.98	-10.00	100.00
250	0.00	100.27	-10.00	100.00
255	0.00	104.54	-10.00	100.00
260	0.00	108.77	-10.00	100.00
265	0.00	112.96	-10.00	100.00
270	0.00	117.09	-10.00	100.00
275	0.00	121.15	-10.00	100.00
280	0.00	125.12	-10.00	100.00
285	0.22	129.07	-10.00	100.00
290	0.34	132.85	-10.00	100.00
295	0.50	136.47	-10.00	100.00
300	0.70	139.90	-10.00	100.00
305	0.87	143.02	-10.00	100.00
310	1.35	146.03	-10.00	100.00
315	1.66	148.46	-10.00	100.00
320	1.71	150.08	-10.00	100.00
325	2.01	151.23	-10.00	100.00
330	2.09	151.40	-10.00	100.00
335	2.43	151.03	-10.00	100.00
340	2.55	149.67	-10.00	100.00
345	2.80	147.77	-10.00	100.00
350	2.83	145.12	-10.00	100.00
355	2.77	142.00	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	05/26/2017
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — RAPID CITY, SD

Venue Name	
Latitude (NAD 83)	44° 2' 51.1" N
Longitude (NAD 83)	103° 14' 39.1" W
Climate Zone	A
Rain Zone	5
Ground Elevation (AMSL)	1173.97 m / 3851.6 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	95.2° W to 95.2° West Longitude
Azimuth Range	168.5° to 168.5°
Corresponding Elevation Angles	38.6° / 38.6°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		9.2 meter
Gain / Diameter		66.1 dBi / 9.2 m
3-dB / 15-dB Beamwidth		0.08° / 0.16°
Max Available RF Power	(dBW/4 kHz)	-59.0
	(dBW/MHz)	-35.0
Maximum EIRP	(dBW/4 kHz)	7.1
	(dBW/MHz)	31.1
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	450MG7W - 470MG7W / 27500.0 - 28600.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**RAPID CITY, SD**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	44° 2' 51.1" N
Longitude (NAD 83)	103° 14' 39.1" W
Ground Elevation (AMSL)	1173.97 m / 3851.6 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	140.00	-10.00	100.00
5	0.00	138.55	-10.00	100.00
10	0.00	136.67	-10.00	100.00
15	0.00	134.40	-10.00	100.00
20	0.00	131.80	-10.00	100.00
25	0.00	128.94	-10.00	100.00
30	0.00	125.84	-10.00	100.00
35	0.00	122.56	-10.00	100.00
40	0.00	119.13	-10.00	100.00
45	0.00	115.57	-10.00	100.00
50	0.00	111.91	-10.00	100.00
55	0.00	108.17	-10.00	100.00
60	0.00	104.37	-10.00	100.00
65	0.00	100.52	-10.00	100.00
70	0.00	96.64	-10.00	100.00
75	0.00	92.75	-10.00	100.00
80	0.00	88.84	-10.00	100.00
85	0.00	84.93	-10.00	100.00
90	0.00	81.04	-10.00	100.00
95	0.00	77.18	-10.00	100.00
100	0.00	73.36	-10.00	100.00
105	0.00	69.60	-10.00	100.00
110	0.00	65.90	-10.00	100.00
115	0.00	62.30	-10.00	100.00
120	0.00	58.81	-10.00	100.00
125	0.00	55.47	-10.00	100.00
130	0.00	52.29	-10.00	100.00
135	0.00	49.33	-10.00	100.00
140	0.00	46.62	-9.71	100.00
145	0.00	44.21	-9.14	100.00
150	0.00	42.16	-8.62	100.00
155	0.00	40.53	-8.19	100.00
160	0.00	39.37	-7.88	100.00
165	0.00	38.72	-7.70	100.00
170	0.00	38.61	-7.67	100.00
175	0.00	39.04	-7.79	100.00
180	0.00	40.00	-8.05	100.00
185	0.00	41.45	-8.44	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**RAPID CITY, SD**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	44° 2' 51.1" N
Longitude (NAD 83)	103° 14' 39.1" W
Ground Elevation (AMSL)	1173.97 m / 3851.6 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	43.33	-8.92	100.00
195	0.00	45.60	-9.47	100.00
200	0.00	48.20	-10.00	100.00
205	0.00	51.06	-10.00	100.00
210	0.00	54.16	-10.00	100.00
215	0.33	57.27	-10.00	100.00
220	0.30	60.74	-10.00	100.00
225	0.54	64.23	-10.00	100.00
230	0.69	67.87	-10.00	100.00
235	0.87	71.60	-10.00	100.00
240	0.87	75.45	-10.00	100.00
245	0.84	79.35	-10.00	100.00
250	0.70	83.29	-10.00	100.00
255	0.79	87.22	-10.00	100.00
260	0.61	91.17	-10.00	100.00
265	0.66	95.11	-10.00	100.00
270	0.21	98.98	-10.00	100.00
275	0.42	102.89	-10.00	100.00
280	0.28	106.71	-10.00	100.00
285	0.35	110.51	-10.00	100.00
290	0.00	114.10	-10.00	100.00
295	0.31	117.83	-10.00	100.00
300	0.25	121.31	-10.00	100.00
305	0.00	124.53	-10.00	100.00
310	0.00	127.71	-10.00	100.00
315	0.00	130.67	-10.00	100.00
320	0.00	133.38	-10.00	100.00
325	0.00	135.79	-10.00	100.00
330	0.00	137.84	-10.00	100.00
335	0.22	139.68	-10.00	100.00
340	0.00	140.63	-10.00	100.00
345	0.00	141.28	-10.00	100.00
350	0.00	141.39	-10.00	100.00
355	0.46	141.41	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	05/26/2017
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — RIFLE, CO

Venue Name	
Latitude (NAD 83)	39° 32' 30.4" N
Longitude (NAD 83)	107° 46' 56.7" W
Climate Zone	A
Rain Zone	5
Ground Elevation (AMSL)	1637.72 m / 5373.1 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	95.2° W to 95.2° West Longitude
Azimuth Range	160.7° to 160.7°
Corresponding Elevation Angles	42.4° / 42.4°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		9.2 meter
Gain / Diameter		66.1 dBi / 9.2 m
3-dB / 15-dB Beamwidth		0.08° / 0.16°
Max Available RF Power	(dBW/4 kHz)	-59.0
	(dBW/MHz)	-35.0
Maximum EIRP	(dBW/4 kHz)	7.1
	(dBW/MHz)	31.1
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	450MG7W - 470MG7W / 27500.0 - 28600.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**RIFLE, CO**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	39° 32' 30.4" N
Longitude (NAD 83)	107° 46' 56.7" W
Ground Elevation (AMSL)	1637.72 m / 5373.1 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	2.08	136.01	-10.00	100.00
5	1.47	133.50	-10.00	100.00
10	1.21	131.00	-10.00	100.00
15	1.36	128.52	-10.00	100.00
20	1.62	125.86	-10.00	100.00
25	1.97	122.99	-10.00	100.00
30	1.80	119.66	-10.00	100.00
35	1.88	116.32	-10.00	100.00
40	2.28	112.96	-10.00	100.00
45	2.72	109.48	-10.00	100.00
50	2.49	105.72	-10.00	100.00
55	2.93	102.04	-10.00	100.00
60	3.44	98.29	-10.00	100.00
65	3.79	94.44	-10.00	100.00
70	3.83	90.53	-10.00	100.00
75	3.76	86.63	-10.00	100.00
80	3.57	82.76	-10.00	100.00
85	3.38	78.92	-10.00	100.00
90	3.41	75.10	-10.00	100.00
95	3.66	71.27	-10.00	100.00
100	3.86	67.48	-10.00	100.00
105	3.81	63.86	-10.00	100.00
110	3.39	60.51	-10.00	100.00
115	3.26	57.19	-10.00	100.00
120	3.51	53.83	-10.00	100.00
125	3.63	50.71	-10.00	100.00
130	3.62	47.91	-10.00	100.00
135	3.52	45.46	-9.44	100.00
140	3.27	43.48	-8.96	100.00
145	3.35	41.62	-8.48	100.00
150	3.48	40.15	-8.09	100.00
155	3.57	39.19	-7.83	100.00
160	3.45	38.96	-7.77	100.00
165	3.87	38.75	-7.71	100.00
170	3.94	39.41	-7.89	100.00
175	3.84	40.75	-8.25	100.00
180	3.65	42.62	-8.74	100.00
185	4.06	44.38	-9.18	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**RIFLE, CO**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	39° 32' 30.4" N
Longitude (NAD 83)	107° 46' 56.7" W
Ground Elevation (AMSL)	1637.72 m / 5373.1 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	5.06	46.12	-9.60	100.00
195	4.99	49.01	-10.00	100.00
200	4.52	52.37	-10.00	100.00
205	3.45	56.19	-10.00	100.00
210	2.69	59.91	-10.00	100.00
215	2.43	63.45	-10.00	100.00
220	1.98	67.14	-10.00	100.00
225	1.60	70.85	-10.00	100.00
230	1.37	74.55	-10.00	100.00
235	1.05	78.29	-10.00	100.00
240	1.26	81.98	-10.00	100.00
245	1.27	85.72	-10.00	100.00
250	1.53	89.48	-10.00	100.00
255	1.74	93.27	-10.00	100.00
260	1.94	97.08	-10.00	100.00
265	2.06	100.86	-10.00	100.00
270	2.21	104.64	-10.00	100.00
275	2.50	108.41	-10.00	100.00
280	2.29	111.99	-10.00	100.00
285	3.35	115.96	-10.00	100.00
290	2.95	119.29	-10.00	100.00
295	4.16	123.28	-10.00	100.00
300	4.50	126.75	-10.00	100.00
305	3.99	129.52	-10.00	100.00
310	3.42	131.95	-10.00	100.00
315	3.89	134.83	-10.00	100.00
320	3.98	137.13	-10.00	100.00
325	4.64	139.56	-10.00	100.00
330	3.80	140.16	-10.00	100.00
335	3.06	140.31	-10.00	100.00
340	2.88	140.46	-10.00	100.00
345	2.68	140.07	-10.00	100.00
350	2.29	138.99	-10.00	100.00
355	1.84	137.39	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	05/26/2017
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — SIMI VALLEY, CA

Venue Name	
Latitude (NAD 83)	34° 16' 7.7" N
Longitude (NAD 83)	118° 42' 24.8" W
Climate Zone	A
Rain Zone	4
Ground Elevation (AMSL)	291.59 m / 956.7 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	95.2° W to 95.2° West Longitude
Azimuth Range	142.3° to 142.3°
Corresponding Elevation Angles	42.9° / 42.9°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		9.2 meter
Gain / Diameter		66.1 dBi / 9.2 m
3-dB / 15-dB Beamwidth		0.08° / 0.16°
Max Available RF Power	(dBW/4 kHz)	-59.0
	(dBW/MHz)	-35.0
Maximum EIRP	(dBW/4 kHz)	7.1
	(dBW/MHz)	31.1
	(dBW)	
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	450MG7W - 470MG7W / 27500.0 - 28600.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**SIMI VALLEY, CA**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	34° 16' 7.7" N
Longitude (NAD 83)	118° 42' 24.8" W
Ground Elevation (AMSL)	291.59 m / 956.7 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	2.19	126.85	-10.00	100.00
5	3.00	124.32	-10.00	100.00
10	2.78	120.98	-10.00	100.00
15	2.42	117.46	-10.00	100.00
20	2.59	114.05	-10.00	100.00
25	3.00	110.61	-10.00	100.00
30	2.90	106.91	-10.00	100.00
35	2.66	103.13	-10.00	100.00
40	3.88	99.54	-10.00	100.00
45	3.85	95.68	-10.00	100.00
50	3.64	91.79	-10.00	100.00
55	4.10	87.91	-10.00	100.00
60	4.44	83.99	-10.00	100.00
65	4.39	80.11	-10.00	100.00
70	3.77	76.38	-10.00	100.00
75	3.44	72.68	-10.00	100.00
80	4.21	68.75	-10.00	100.00
85	5.95	64.44	-10.00	100.00
90	6.74	60.43	-10.00	100.00
95	6.96	56.72	-10.00	100.00
100	5.66	53.95	-10.00	100.00
105	4.51	51.45	-10.00	100.00
110	5.74	47.67	-9.96	100.00
115	6.65	44.24	-9.15	100.00
120	7.97	40.69	-8.24	100.00
125	8.75	37.82	-7.44	100.00
130	9.69	35.19	-6.66	100.00
135	8.91	34.69	-6.50	100.00
140	10.43	32.56	-5.82	100.00
145	9.22	33.79	-6.22	100.00
150	10.52	33.20	-6.03	100.00
155	12.23	32.96	-5.95	100.00
160	13.55	33.87	-6.24	100.00
165	13.65	36.40	-7.03	100.00
170	12.93	39.91	-8.03	100.00
175	11.92	43.82	-9.04	100.00
180	11.38	47.58	-9.94	100.00
185	11.03	51.38	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**SIMI VALLEY, CA**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	34° 16' 7.7" N
Longitude (NAD 83)	118° 42' 24.8" W
Ground Elevation (AMSL)	291.59 m / 956.7 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	9.94	55.61	-10.00	100.00
195	9.18	59.73	-10.00	100.00
200	7.99	64.00	-10.00	100.00
205	7.47	68.05	-10.00	100.00
210	5.84	72.36	-10.00	100.00
215	5.45	76.33	-10.00	100.00
220	4.66	80.36	-10.00	100.00
225	4.42	84.28	-10.00	100.00
230	3.01	88.22	-10.00	100.00
235	2.88	92.05	-10.00	100.00
240	2.15	95.81	-10.00	100.00
245	1.02	99.41	-10.00	100.00
250	0.37	102.93	-10.00	100.00
255	0.00	106.40	-10.00	100.00
260	0.00	109.89	-10.00	100.00
265	0.00	113.29	-10.00	100.00
270	0.00	116.60	-10.00	100.00
275	0.00	119.77	-10.00	100.00
280	0.00	122.79	-10.00	100.00
285	0.00	125.62	-10.00	100.00
290	0.48	128.59	-10.00	100.00
295	0.82	131.24	-10.00	100.00
300	0.92	133.43	-10.00	100.00
305	1.19	135.44	-10.00	100.00
310	1.31	136.93	-10.00	100.00
315	1.82	138.37	-10.00	100.00
320	2.15	139.18	-10.00	100.00
325	3.04	140.05	-10.00	100.00
330	3.00	139.47	-10.00	100.00
335	2.52	137.99	-10.00	100.00
340	2.68	136.66	-10.00	100.00
345	2.55	134.67	-10.00	100.00
350	2.20	132.16	-10.00	100.00
355	2.47	129.83	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	05/26/2017
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — TUCSON, AZ

Venue Name	
Latitude (NAD 83)	32° 10' 18.6" N
Longitude (NAD 83)	110° 57' 16.9" W
Climate Zone	A
Rain Zone	5
Ground Elevation (AMSL)	761.67 m / 2498.9 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	95.2° W to 95.2° West Longitude
Azimuth Range	152.1° to 152.1°
Corresponding Elevation Angles	48.8° / 48.8°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		9.2 meter
Gain / Diameter		66.1 dBi / 9.2 m
3-dB / 15-dB Beamwidth		0.08° / 0.16°
Max Available RF Power	(dBW/4 kHz)	-59.0
	(dBW/MHz)	-35.0
Maximum EIRP	(dBW/4 kHz)	7.1
	(dBW/MHz)	31.1
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	450MG7W - 470MG7W / 27500.0 - 28600.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**TUCSON, AZ**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	32° 10' 18.6" N
Longitude (NAD 83)	110° 57' 16.9" W
Ground Elevation (AMSL)	761.67 m / 2498.9 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 9.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	125.56	-10.00	100.00
5	0.00	123.54	-10.00	100.00
10	0.00	121.28	-10.00	100.00
15	0.00	118.82	-10.00	100.00
20	0.00	116.17	-10.00	100.00
25	0.00	113.38	-10.00	100.00
30	0.00	110.46	-10.00	100.00
35	0.00	107.44	-10.00	100.00
40	0.00	104.33	-10.00	100.00
45	0.00	101.15	-10.00	100.00
50	0.00	97.92	-10.00	100.00
55	0.00	94.66	-10.00	100.00
60	0.00	91.37	-10.00	100.00
65	0.00	88.08	-10.00	100.00
70	0.00	84.80	-10.00	100.00
75	0.22	81.50	-10.00	100.00
80	0.25	78.26	-10.00	100.00
85	0.28	75.07	-10.00	100.00
90	0.30	71.94	-10.00	100.00
95	0.32	68.90	-10.00	100.00
100	0.34	65.97	-10.00	100.00
105	0.38	63.16	-10.00	100.00
110	0.38	60.52	-10.00	100.00
115	0.40	58.05	-10.00	100.00
120	0.40	55.80	-10.00	100.00
125	0.38	53.82	-10.00	100.00
130	0.37	52.10	-10.00	100.00
135	0.34	50.70	-10.00	100.00
140	0.33	49.62	-10.00	100.00
145	0.33	48.90	-10.00	100.00
150	0.30	48.57	-10.00	100.00
155	0.28	48.63	-10.00	100.00
160	0.25	49.07	-10.00	100.00
165	0.23	49.88	-10.00	100.00
170	0.21	51.03	-10.00	100.00
175	0.00	52.68	-10.00	100.00
180	0.00	54.44	-10.00	100.00
185	0.00	56.46	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**TUCSON, AZ**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	32° 10' 18.6" N
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Max Available RF Power	-59.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	58.72	-10.00	100.00
195	0.00	61.18	-10.00	100.00
200	0.00	63.83	-10.00	100.00
205	0.34	66.45	-10.00	100.00
210	0.00	69.54	-10.00	100.00
215	0.00	72.56	-10.00	100.00
220	0.00	75.67	-10.00	100.00
225	0.00	78.85	-10.00	100.00
230	0.00	82.08	-10.00	100.00
235	0.00	85.34	-10.00	100.00
240	0.00	88.63	-10.00	100.00
245	0.00	91.92	-10.00	100.00
250	0.00	95.20	-10.00	100.00
255	0.00	98.46	-10.00	100.00
260	0.24	101.73	-10.00	100.00
265	0.83	105.10	-10.00	100.00
270	0.69	108.20	-10.00	100.00
275	0.34	111.10	-10.00	100.00
280	0.64	114.18	-10.00	100.00
285	0.31	116.80	-10.00	100.00
290	0.00	119.24	-10.00	100.00
295	0.00	121.67	-10.00	100.00
300	0.00	123.89	-10.00	100.00
305	0.00	125.87	-10.00	100.00
310	0.27	127.82	-10.00	100.00
315	1.38	130.26	-10.00	100.00
320	1.00	131.01	-10.00	100.00
325	0.00	130.78	-10.00	100.00
330	0.00	131.12	-10.00	100.00
335	0.00	131.09	-10.00	100.00
340	0.00	130.68	-10.00	100.00
345	0.00	129.90	-10.00	100.00
350	0.00	128.77	-10.00	100.00
355	0.00	127.32	-10.00	100.00

Contact Information

For questions or information regarding the 28 GHz Frequency Coordination Report, please contact:

Contact person:	Joanna Lynch
Title:	Manager, Spectrum & Data Solutions
Company:	Comsearch
Address:	19700 Janelia Farm Blvd., Ashburn, VA 20147
Telephone:	703-726-5711
Fax:	703-726-5599
Email:	jlynch@comsearch.com
Web site:	www.comsearch.com